

PATENT SPECIFICATION

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NO DRAWINGS.

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COMPLETE SPECIFICATION.

Improvements relating to Polyethylene Plastic Materials.

We, MONSANTO CHEMICALS LIMITED, a British Company, of Monsanto House, 10—18 Victoria Street, London, S.W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to polyethylene plastic materials, and particularly to the treatment of polyethylene plastic materials to reduce their tendency to accumulate electrostatic charges.

15 Polyethylene, because it is a good electrical insulator, tends to accumulate electrostatic charges when rubbed or touched, and this is a disadvantage in many instances; particularly for example when the polyethylene is in the form of film. For instance the presence of electrostatic charges not only causes dust to adhere, but also causes a sheet of film to stick to another sheet or to processing machinery. The problem is a difficult one to solve, and although several methods of doing so have been proposed, they are not always satisfactory in every instance.

20 The present invention is for a polyethylene plastic material containing sufficient of an ethanalamide of lauric acid to reduce the tendency of the polyethylene to accumulate electrostatic charges.

25 The ethanalamide that is preferred and which gives particularly good results is the diethanalamide of lauric acid, although the monoethanalamide is useful in some circumstances. The diethanalamide of lauric acid can be employed in the form of the diethanalamide of coconut fatty acids; this product is a liquid consisting essentially of the diethanalamide of lauric acid together with

small quantities of the diethanolamides of fatty acids higher and lower than lauric acid.

45 The polyethylene plastic material can include either what is known as "high pressure" polyethylene or "low pressure" polyethylene, or it can include both types of polyethylene. In general the density of the polyethylene can for example be in the range of 0.914 to 0.945 or even higher, for instance in the range of 0.914 or 0.916 to 0.930.

50 The polyethylene plastic material can contain, if appropriate, other components, for instance carbon black, pigments, dyes, antioxidants, anti-block additives and slip additives.

55 The quantity of the ethanalamide of lauric acid can vary considerably, but there can for instance be employed from 0.005% to 1.0% of the weight of the polyethylene plastic material for instance from 0.01 or 0.02% to 0.5%, and particularly from 0.01% to 0.1% or 0.2%. About 0.05% of the ethanalamide often gives excellent results.

60 The appropriate quantity of the ethanalamide of lauric acid can be incorporated by blending it with polyethylene under the influence of heat and pressure, for instance by mixing together the polyethylene and the ethanalamide to give a mouldable composition, or by introducing the ethanalamide into the reactor in which the polyethylene is being produced. Polyethylene and the ethanalamide can be mechanically mixed together by a variety of methods, and when this procedure is adopted the actual method chosen will depend to some extent on the desired final physical form of the polyethylene. For example the ethanalamide can conveniently be incorporated into the polyethylene in a heated mixing machine, such as a Banbury mixer, to give a mouldable composition. This can be moulded or extruded directly, or

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it can be extruded in the form of rods which are chopped up into pellets and used in subsequent operations for instance in the production of film by blow extrusion or the production of articles by injection moulding. If desired the ethanolamide can be employed as a concentrated "master-batch" in polyethylene.

The invention is illustrated by the following example.

EXAMPLE.

This example describes the antistatic effect on polyethylene of 0.05% of the diethanolamide of lauric acid.

20 lb. of pelleted polyethylene having a density of 0.921 and a Melt Index of 2 were placed in a Banbury mixer, and 4.5 grams of the diethanolamide were scattered on top of the polyethylene pellets. The Banbury mixer was operated at about 150° C. for 4 minutes, and the resulting mixture was then extruded as a solid rod about $\frac{1}{4}$ inch in diameter, cooled, and chopped up into pellets.

These pellets were fed into a small-scale blow extrusion apparatus, and used to produce lay-flat tubing 12 inches wide and having a thickness of 0.0015 of an inch.

A 12" length of the lay-flat film was rubbed ten times in a reproducible manner with a dry cloth, and the electrostatic charges present on the surface were measured by means of the commercially available electrometer known as the Baldwin-Dunlop Statigun, Mark 4.

As a control there was also prepared lay-flat tubing of the same dimensions from a sample of the polyethylene which did not contain the diethanolamide, and this tubing was then examined for antistatic properties in exactly the same way.

The value obtained on the scale of the Statigun for the polyethylene control was 300 units, whilst it was only 5 units for the

polyethylene containing the diethanolamide, showing the very considerably reduction in the electrostatic charge present on the film containing the diethanolamide.

WHAT WE CLAIM IS:—

1. A polyethylene plastic material containing sufficient of an ethanolamide of lauric acid to reduce the tendency of the polyethylene to accumulate electrostatic charges.

2. A polyethylene plastic material according to Claim 1 which contains the diethanolamide of lauric acid.

3. A polyethylene plastic material according to Claim 2 which contains the diethanolamide of coconut fatty acids.

4. A polyethylene plastic material according to any of Claims 1 to 3, in which the polyethylene has a density in the range of 0.914 to 0.930.

5. A polyethylene plastic material according to any of Claims 1 to 4, which contains from 0.005 to 1% of the ethanolamide based on the weight of the plastic material.

6. A polyethylene plastic material according to Claim 5 which contains from 0.01% to 0.1% of the ethanolamide.

7. A polyethylene plastic material substantially as described in the example.

8. A polyethylene plastic material according to any of Claims 1 to 7 in the form of film.

9. A process for producing a polyethylene plastic material as defined in any of Claims 1 to 8, in which the ethanolamide is blended with polyethylene under the influence of heat and pressure.

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PROVISIONAL SPECIFICATION.

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